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Clocks | Quartz | Atomic



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In this article, we will explore two different type of clocks namely **quartz**, and **atomic** clocks.

Quartz Clocks

Quartz clocks are used in almost every time measuring devices, they keeps better time than the best mechanical clocks. It contains a **specially cut quartz crystal** that vibrates at particular frequency. Quartz is made from a chemical compound called

silicon dioxide (Silicon is also a stuff from computer chips are made). Perhaps most interesting thing about quartz is that it's **piezoelectric**. That means if you squeeze a quartz crystal, it generates a tiny electric voltage. The opposite is also true: if you apply a voltage to a piece of quartz, it vibrates at a precise frequency (it shakes an exact number of times each second).



Photo: Crystals of quartz. Photo by courtesy of [US Geological Survey](#).

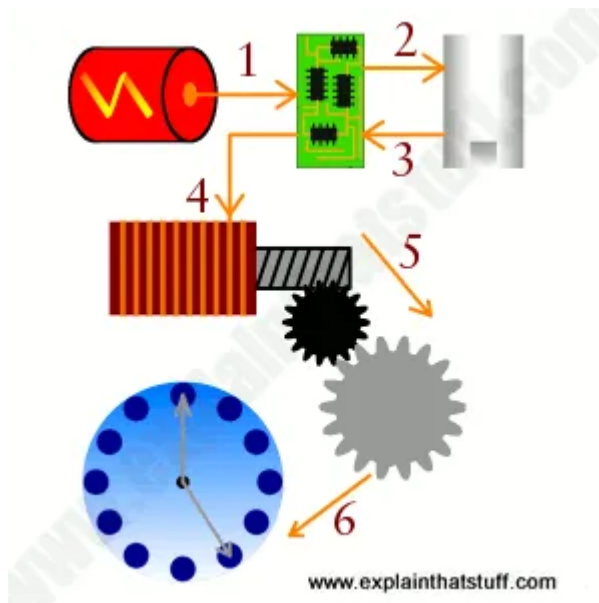


Photo: Working principle of quartz clock. Photo by courtesy of www.explainthatstuff.com

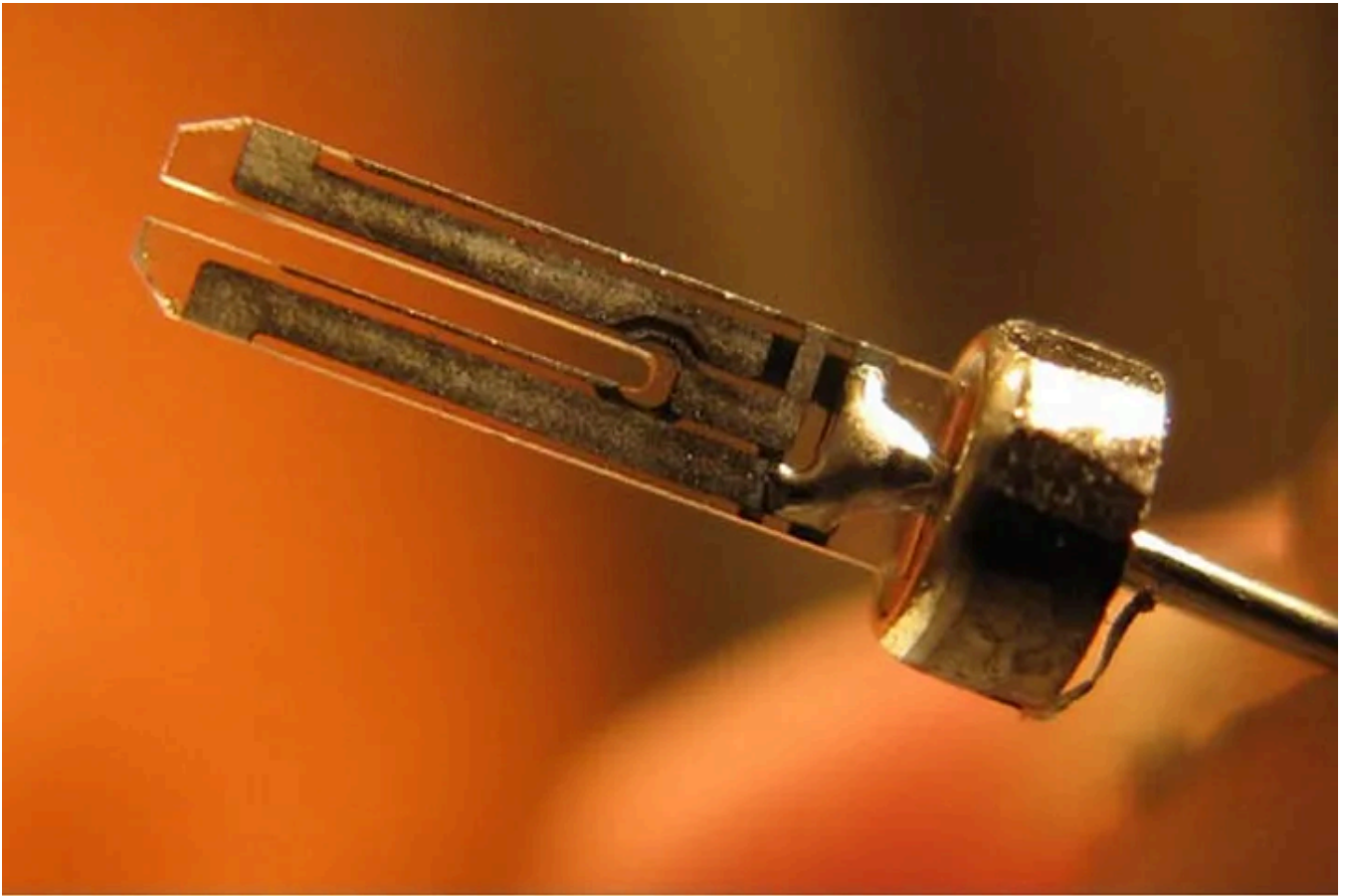


Photo: Quartz crystal oscillator used in Quartz watches. Photo by courtesy of <https://tellioglu.com.tr>

In theory, it works like this:

1. Battery provides current to microchip circuit
2. Microchip circuit makes quartz crystal (precisely cut and shaped like a tuning fork) oscillate (vibrate) **32768** times per second.
3. Microchip circuit detects the crystal's oscillations and turns into regular electrical pulses, one per second.
4. Electric pulses drive miniature electric stepping motor. This converts electric energy into mechanical power.
5. Electric stepping motor turns gears.
6. Gears sweep the hands around the clock face to keep time.

In practice...

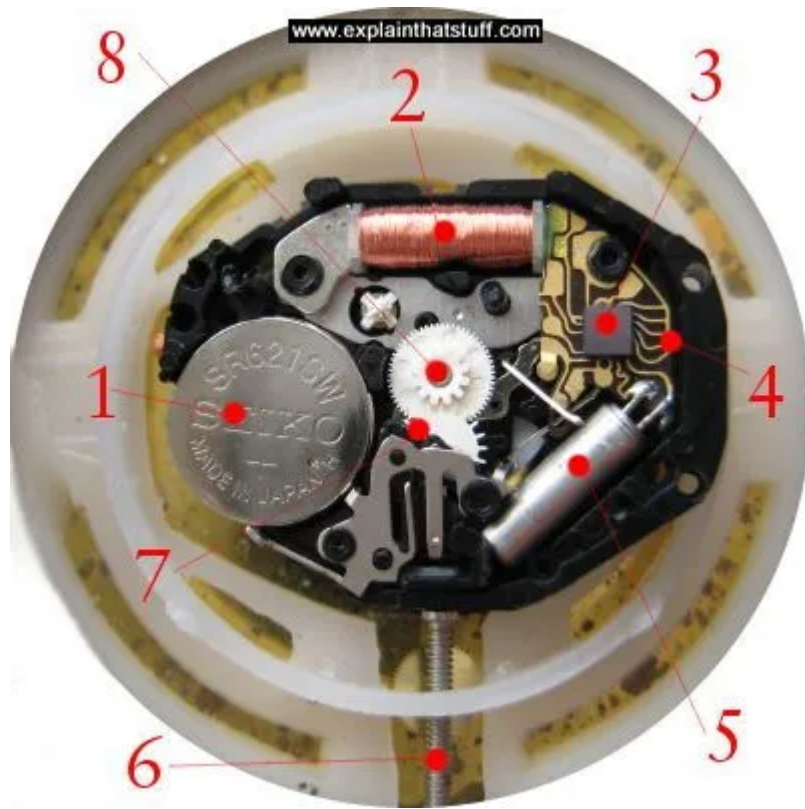


Photo: Anatomy of Quartz watch. Photo by courtesy of www.explainthatstuff.com

1. Battery
2. Electric stepping motor
3. Microchip
4. Circuit connects microchip and other components
5. Quartz crystal oscillator
6. Crown skew for setting time
7. Gears turn hour, minute, and second hands at different speeds

Atomic Clocks

An extremely **accurate** type of clock which is regulated by the vibrations of an atomic or molecular system such as caesium.

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Written by Suresh Podeti

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